
**Cranes — Wire ropes — Care and
maintenance, inspection and discard**

*Appareils de levage à charge suspendue — Câbles en acier —
Entretien et maintenance, inspection et dépose*



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 96, *Cranes*, Subcommittee SC 3, *Ropes*.

This fifth edition cancels and replaces the fourth edition (ISO 4309:2010), which has been technically revised and contains the following changes:

- magnetic rope test (MRT) methodology and discard criteria are introduced, as an aid to the internal inspection of wire ropes;
- guidance is given on when to use magnetic rope testing and how to combine its results with other inspection results;
- an example of an MRT report is provided.

Introduction

A wire rope on a crane is regarded as an expendable component, requiring replacement when the results of inspection indicate that its condition has diminished to the point where further use might be unsafe.

By following well-established principles such as those detailed in this document, along with any additional specific instructions provided by the manufacturer of the crane or hoist and/or by the manufacturer of the rope, this point should never be exceeded.

When correctly applied, the discard criteria given in this document are aimed at retaining an adequate safety margin. Failure to recognize them can be extremely harmful, dangerous and damaging.

To assist those who are responsible for “care and maintenance” as distinct from those who are responsible for “inspection and discard”, the procedures are conveniently separated.

Cranes — Wire ropes — Care and maintenance, inspection and discard

1 Scope

This document establishes general principles for the care and maintenance, and inspection and discard of steel wire ropes used on cranes and hoists.

In addition to guidance on storage, handling, installation and maintenance, this document provides discard criteria for those running ropes which are subjected to multi-layer spooling, where both field experience and testing demonstrate that deterioration is significantly greater at the crossover zones on the drum than at any other section of rope in the system.

It also provides more realistic discard criteria covering decreases in rope diameter and corrosion, and gives a method for assessing the combined effect of deterioration at any position in the rope.

This document is applicable to those ropes used on the following types of cranes, the majority of which are defined in ISO 4306-1:

- a) cable and portal cable cranes;
- b) cantilever cranes (pillar jib, wall or walking);
- c) deck cranes;
- d) derrick and guy derrick cranes;
- e) derrick cranes with rigid bracing;
- f) floating cranes;
- g) mobile cranes;
- h) overhead travelling cranes;
- i) portal or semi-portal bridge cranes;
- j) portal or semi-portal cranes;
- k) railway cranes;
- l) tower cranes;
- m) offshore cranes, i.e. cranes mounted on a fixed structure supported by the sea bed or on a floating unit supported by buoyancy forces.

This document applies to rope on cranes, winches and hoists used for hook, grabbing, magnet, ladle, excavator or stacking duties, whether operated manually, electrically or hydraulically.

It also applies to rope used on hoists and hoist blocks.

NOTE In view of the fact that the exclusive use of synthetic sheaves or metal sheaves incorporating synthetic linings is not recommended when single-layer spooling at the drum, due to the inevitability of wire breaks occurring internally in large numbers before there is any visible evidence of any wire breaks or signs of substantial wear on the periphery of the rope, no discard criteria are given for this combination.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4301-1:1986,¹⁾ *Cranes and lifting appliances — Classification — Part 1: General*

ISO 17893, *Steel wire ropes — Vocabulary, designation and classification*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 17893 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1 nominal diameter

d

diameter by which the rope is designated

3.2 measured diameter actual diameter

d_m

average of two measurements, taken at right angles to one another, of the diameter that circumscribes the rope cross-section

3.3 reference diameter

d_{ref}

measured diameter (3.2) of a section of rope that is not subject to bending, taken directly after running in the new rope

Note 1 to entry: This diameter is used as the baseline for uniform change in diameter.

3.4 crossover zone

that portion of rope coincident with a crossing over of one wrap by another as the rope traverses the drum or rises from one layer to the next at the drum flange

3.5 wrap

one revolution of rope around a drum

3.6 reel

flanged spool on which rope is wound for shipment or storage

1) This edition of ISO 4301-1 has been provisionally retained.